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Thirty years ago "Crania Ethnica" made its appearance. Referring to the inhabitants of New Britain, now called Neu Pommern, de Quatrefages and Hamy declared that: "nothing is known of their crania of which there is not a single example in the scientific collections."[1] Neu Pommern is the first large island directly east of German New Guinea; Gazelle Peninsula is the eastern end of Neu Pommern.

Large collections of crania have been made since then, but they have been only partially described; so that our knowledge of Neu Pommern craniology is still meager. In 1899 learning of a series of twenty-four skulls from Gazelle Peninsula, the property of the University Museum, I obtained permission to examine them. The study which I now present was begun at that time and finished in the summer of 1913.

The present inhabitants of Melanesia are of mixed blood; Negrito, Papuan, and Dravidian being the chief elements. The several islands are not uniformly affected by intermixture. Thus according to Turner,[2] two distinct types of skull have been met with in New Guinea—a brachycephalic in which the breadth of the cranium as a rule exceeds the height; and a dolichocephalic in which the height usually exceeds the breadth. I have yet to hear of a brachycephalic type existing in Gazelle Peninsula. The crania under consideration certainly do not reveal it. They are not only all dolichocephalic, but with a single exception (11613 and perhaps 11612), are also remarkably homogeneous in character.

[1] Text, p. 276.

[2] Challenger report.

Dr. R. Hartman[1] speaks of the men as varying in height from 1.60 m. to 1.80 m., generally slender and the muscles only moderately well developed. The head is high and narrow (hypsistenocephaly) with here and there a tendency to scaphocephaly. According to the same author, the frontal protuberances are rather large. The torus occipitalis transversus is sometimes prominent, the superciliary arches well developed; the demarcation between forehead and nose is sharp, a character common among Melanesian races. The nose is rather flat, the chin broad; the eyes are deep set, appear small, and are dark to grayish-brown. The ears are well-formed; the muscles which move the jaws are strong. The large teeth are white when not colored yellowish-brown by chewing betel.

General Cranial Characters

Eleven of the skulls from Gazelle Peninsula are of the male sex, eight are of the female sex, and five are of youths and children. The average age of the adults was about thirty-eight years.

Norma occipitalis.—Viewed from behind, there is a prominent crest at the vertex in Nos. 16911 and 18283, male and female respectively. In the female series, there is a pronounced depression in two crania (11614, 18283) along the sagittal suture from the lambda to within 27 mm. of the bregma.

The norma lateralis in the males reveals prominent glabella and superciliary ridges with the exception of No. 11622. When resting on their bases, the mastoid processes do not touch in any of the male crania; No. 18280 rests on the occipital condyles; and all others, on either the posterior margin of the foramen magnum, or the occipital immediately back of the foramen magnum. Only one female cranium rests on the mastoid processes; one rests on the condyles, and all the others, on either the posterior margin of the foramen magnum or the occipital just back of the foramen.

[1] Forschungsreise S.M.S. "Gazelle" in den Jahren 1874 bis 1876, I.

The inion is not prominent, never exceeding 2 of Broca's scale even among the males. The linea nuchae suprema is easily visible in four males and one female. The occurrence of parietal foramina may be shown to best advantage by tabulation:

Males	Side	Females	Side
11621	right	11620	right
11610	"	11613	"
11612	"	11609	"
11611	"	18284	"
16911	"	11619	left
11617	left	16913	both
11618	"		
18282	"		
11615	both		

Region of the pterion.—The frequency with which a contact between the frontal and temporal bones takes place varies among the different races of mankind.

In the series from Gazelle Peninsula the temporo-frontal articulation occurs on both sides in three crania and on one side in four crania. In two of the latter the temporal bone touched the frontal by means of a point only, instead of along a suture line. The so-called *pterion retourné* is found therefore either on one or both sides in 29 per cent of the crania. Or to put it in another way out of total of 48 pterions (counting the two sides in every case) the reverse form occurs ten times, which is 20.8 per cent of the whole. There are only three occurrences of wormian bones in the region of the pterion (in one case on both sides). Thus ten out of the twenty-four crania have anomalies of the pterion. This is practically the same percentage (41.6) as in the series of 150 crania from Neu Pommern and Mioko described by Krause. He found the reversed pterion in 32 out of 150 crania (21.3 per cent); in

fourteen of these it occurred on both sides, making 46 reversed pterions out of a total of 300 (15.3 per cent). Krause also reports epipteric bones in 31 crania (on both sides in 18). The Papuans are also noted for the relatively great number of irregularities in the pterionic region. In a collection of fourteen crania from New Guinea belonging to Yale University Museum, I found the reversed pterion in five (on both sides in four of these); while epipteric bones were present in seven out of the fourteen crania. Dorsey[1] also found a high percentage of irregularities of the pterion in a series of twenty crania from New Guinea, only half of them having the normal pterion in H; two crania with pterion in K, four with pterion reversed by a frontal process from the temporal bone, and four with epipteric bones. Thus the natives of New Guinea as well as of the islands directly to the east are characterized by an unusually high percentage of anomalies in the region of the pterion.

Articulatio spheno-maxillaris.—A union of the ala magna of the sphenoid with the superior maxillary; i. e., the failure of the cheek bone to reach the fissura orbitalis, takes place in nineteen out of twenty-three skulls (82.6 per cent) and as follows:

Males	Side	Females and Youths	Side
18280	Both sides	18281	Both sides
11621	" "	18283	" "
11610	" "	11609	" "
11617	" "	16912	" "
11612	" "	11619	" "
11618	" "	11616	" "
18282	" "	16913	" "
11622	" "	16914	" "
16911	Left side	11620	" "
11615	" "		

[1] Field Columbian Museum, Publication 21.

The external auditory meatus is not affected, in a single instance, by exostoses.

Foramen pterygo-spinosum.—The spheno-pterygoid foramen is formed by the ossification of the ligamentum pterygo-spinosum. It occurs as follows in the series from Gazelle Peninsula:

No. 18282, male. Right side, the foramen is complete, the processes from the pterygoid lamina and spina angularis meeting in a suture line. On the left side, the two processes lack 12 mm. of joining.

No. 11613, female. On right side, a completely ossified ligament forming a small spheno-pterygoid foramen.

No. 11614, female. Processes for attachment of the ligament at either end, 5 mm. apart on right side, and 6 mm. apart on left side.

Turner found the spheno-pterygoid foramen with complete osseous boundaries in three skulls of the Challenger series. According to Roth,[1] the percentage of occurrences for 287 Europeans is 4.8. Its percentage with partial and complete bony walls, is much higher among some races: Asiatics, 32 per cent; Australians and Papuans, 50 per cent; Africans, 30.6 per cent; American Indians, 20 per cent.

The Pars tympanica (anterior portion) of the temporal bone is either perforated or extremely thin in two male (11617, 11615) and three female crania (11614, 18283, 11613). Five males (Nos. 18280, 11610, 11612, 16911, 18282) and two females (18283, 11609) have prominent para-mastoid processes.

There is a prominent third occipital condyle in No. 18283. This anomaly[2] is important in that it admits of comparisons being made with the single median condyle of birds and scaly reptiles. J. F. Meckel[3] was the first to call attention to the condylus tertius in man. In a series of 876 crania at Leiden, Dr. Halbertsma found seven well developed cases of the third

[1] *Archiv für Anthropologie*, XIV, 73.

[2] Blake, *Anthropological Review*, V, p. CXVII.

[3] Meckel's *Archiv*, 1815, I, 644.

condyle, not including those in which there is merely an articular groove for the tooth of the epistropheus. Dr. H. Allen states that in the Morton collection of crania, ten specimens possess a third condyle. Sir William Turner mentions four cases among the 143 crania described in the Challenger Report. He also describes a skull from Port Moresby,[1] New Guinea, possessing the condylus tertius. According to Krause there are three cases of condylus tertius in 150 crania from Neu Pommern and Mioko.

There are slight traces of the metopic suture in three crania, two males (11612, 11615) and one youth (16913).

The frontal bone articulates with a process of the superior maxillary between the lachrymal and the os planum (lamina papyracea) of the ethmoid in two crania (11610, 11619) and, in each case, on the left side only. This marks a reversion to the pithecoid arrangement as pointed out by Sir William Turner.[2] Among anthropoids, the os planum is triangular, and the fronto-maxillary articulation always occurs between it and the lachrymal.

The infra-orbital suture is present in two males (11621, 11612), and two females (18283, 11609). The fossae caninae are pronounced in all.

Apertura pyriformis.—The anterior nasal opening presents anthropoid characters in every instance. Four of the male crania (11615–17–18, 16911) possess accentuated simian grooves or gutters; while the fossa pre-nasalis is pronounced in six male (11610–12–21–22, 18280–82) and four female crania (11613–14–19–20). The characteristic human type (forma anthropina) does not occur once in the series.

In two instances, the nasal bones reach to the level of the lower margin of the orbital opening. The anterior nasal spine averages less than No. 2 of Broca's scale. The spina nasalis posterior exhibits no marked variations. It is never

[1] *Journal of Anatomy and Physiology*, XXII, 360.

[2] Report on Human Crania, Vol. X of the Challenger Report, p. 12.

prominent and, in every instance, is formed by the facies nasalis of the right and left os palatinum. The sutura incisivum is fairly distinct in No. 11612, an adult male.

There is not a single example of os zygomaticum duplex (os Japonicum) in the series. The direction of the malotemporal suture is rather steep, and the suture is short in all but three of the males (11611–22, 16911). The same may be said of the female crania, with two exceptions (11623, 18283).

Wormian bones are rare and generally insignificant in size. They occur in only eleven crania, five male, three female, and three children. In addition, there is the suggestion of an os Incae in Nos. 11621 and 16914. In the former, the sutures branch off from the lambdoid suture very near the asterion to disappear after a course of some fifteen mm.; in the latter, the same condition obtains, except that the sutures branch off directly from the asterion. In No. 18282, a child of ten years, there is an epactal bone. The sutures are simple, generally falling between 1 and 3 of Broca's scale.

Krause found the interparietal bone in fifteen out of the 150 crania described by him; in six of these the interparietal might be classed as a true Inca bone.

The Teeth

The teeth that remain are remarkably well preserved, and in only five crania do any of the alveoles manifest a pathological condition. The wisdom tooth is never lacking. There are two examples of supernumerary teeth, as follows: one on the lingual side of the lower right canine in 11621 (male), and one on the lingual side of second lower left premolar in 11609 (female).

Almost without exception, the upper molars of both the males and females have three roots, and these are generally spreading. The first molar is the largest except in three crania where all three are of about equal size. In three

instances, the third upper molar has a single conical root; and in four, there is a tendency to fusion of the roots.

The first upper premolars have two roots in eight out of seventeen skulls. In one of these, there is the suggestion of a third root by the deep grooving of one of the two roots. The roots of the first upper premolars are flattened and grooved in the other crania. The second upper premolars have divided roots in three crania; in thirteen, the roots are grooved or flat; and in only one, are there single, conical roots.

The alveolar arch of the upper jaw is massive and projects beyond the third molar 8.6 mm., on an average, among the males; and 5.2 mm., among the females. There is but a single case of crowding of the teeth, and then only the incisors are affected. The palate inclines to be deep.

The length in situ of the lower molars averages 34.6 mm. The three are generally of about equal size; when not, it is the third or the first which is the largest. In two cases, the third molar has three roots. All other third lower molars have two roots, with a single exception, where there is a fusion of the two roots. All the first lower molars have five cusps where the number can be determined with certainty. Fifty per cent of the second lower molars, and 21.4 per cent of the third, have only four cusps.

The first lower premolar is supplied with an anterior root in five crania; while in nine, there is a single, grooved or flattened root; and in four, there is a single, conical root. There is one example of a divided root among the second lower premolars; five examples of a grooved or flat root; and twelve, of a conical root.

The third molar is generally situated well in front of the ascending ramus of the lower jaw, when the jaw is so held as to bring the anterior margins of the rami in a line with the eye. With the lower jaw held in this position, the entire crown of the third molar can be seen in thirteen out of a total of eighteen cases. Fortunately each cranium is supplied with its own lower jaw.

Measures

Capacity.—The capacity[1] (measured by shot) is small, averaging, for the males, 1345.2 cc.; and for the females, 1214.5. The range of variation for both sexes is small also (1078–1470), both extremes being of the male sex.

Of the Hamburg[2] collection, twenty-six are from Neu Pommern, and 120 are from Mioko, the principal island immediately to the east of Neu Pommern. The crania from both these islands are described as being very much alike, recalling the Viti Island type. The average capacity for the males is 1267 cc.; that for the females is 1180 cc.; and for both sexes 1232 cc. (maximum 1530, minimum 990). As Mioko is separated from Gazelle Peninsula only by the narrow St. George Channel one would expect to find unity in the ethnic type. The comparison of averages is largely deprived of its significance if the series are too small, the sexes mixed, and methods employed are different. Whatever the method great care must be exercised in order to eliminate the personal equation; otherwise the results for the same cranium may vary as much as 100 or even 150 cc. The following table then simply indicates that the cranial capacity for Neu Pommern and Mioko is small whatever the method or whoever the operator:

Authority	No.	Sex	Capacity
Krause	150	Male Female	1267 1180 } millet
MacCurdy	18	Male (10) Female (8)	1345 1214 } shot

Virchow[3] refers to a female skull from Neu Pommern with a capacity of only 860 cc. It came from the same burial

[1] Broca's methods of measurement, unless otherwise specified have been followed.

[2] J. D. E. Schmeltz and R. Krause. Die ethnographisch-anthropologische Abteilung des Museum Godefroy in Hamburg. Hamburg, 1881.

[3] *Zeitschrift für Ethnologie*, 1894, XXVI, 505.

ground as two male skulls, one with a capacity of 2100 cc., and the other 1250 cc. The large skull was probably that of a hydrocephalous individual; and the female skull, that of an idiot. They were collected by Finsch. This goes to show how great individual variations may be even in the same savage race. The three were all of the same type and contemporaneous.

Cephalic index.—The male crania are, each and all, dolichocephalic, with an average index of 70 (range 67.4 to 75). The female crania are dolichocephalic, with the exception of a single case of hyperdolichocephaly, having an average index of 72.5 (range 69.5 to 77.2). The appended table will show the length-breadth index to be very uniform in Neu Pommern and Mioko:

Authority	No.	Sex	Cephalic Index
Krause	150	Male and Female	72.3
MacCurdy	18	Male (11)	70.8
		Female (8)	72.5
			71.2

Frontal diameter.—Broca's stephanic diameter is no longer employed by the French school; they having substituted the maximum frontal which is the greatest diameter of the frontal bone wherever found; this coincides very closely with the stephanic breadth. The average maximum frontal diameter for the eleven male skulls is 108.7 mm., the extremes being 116 mm. and 106 mm., respectively. The average for the eight female skulls is 104 mm. (extremes 108 and 98). The average minimum frontal diameter in the male series is 93.2 mm. (range 98 to 89); while that in the female series is 90.2 mm. (range 95 to 81.5).

Eight out of ten male crania have a greater vertical or length-height index than cephalic (the two exceptions being Nos. 11622 and 11615). In other words, the height is greater

than the greatest breadth. This is also true of one of the two types of skull found in New Guinea. In the female series, the two indices are practically equal, while the average for both sexes is in favor of the vertical index:

	Males	Females	Both Sexes
Average vertical or length-height index...	73.6	71.5	72.5
Average cephalic or breadth index.....	70.8	71.6	71.2

The same character (hypsistenocephaly) is brought out by the large transverso-vertical index $\left(\frac{\text{height} \times 100}{\text{greatest breadth}}\right)$; the average for the males being 104.1; for the females, 99.7; and for both combined, 101.9.

It naturally follows that the crania are markedly phaenozygous, the bizygomatic diameter averaging 18.4 mm. longer than the maximum frontal (14.7 mm. for males, and 22.1 mm. for females) and even 1.7 mm. longer than the greatest breadth of the skull:

	Ten Males	Eight Females	Both Sexes
Bizygomatic diameter..	133.4	126.1	129.7
Maximum frontal diameter.....	108.7	104	106.3
Maximum transverse diameter.....	129.9	126.2	128

Prognathism is a prominent feature in the entire series, the average index, Gnathic[1] of Flower, being 106.7 (range 102 to 111.6).

[1] $\left(\frac{\text{Basi-alveolar length} \times 100}{\text{Basi-nasal length}}\right)$. See *Journal of the Anthropological Institute*, X, 163, 164.

	Orthognathous (Below 98)	Mesognathous (98 to 103)	Prognathous (Above 103)	Average
Males	0	1	9	Prognathous
Females	0	1	7	"

It will be seen from the following table that other Melanesian groups are also prognathous:

Authority	Number	Sex	Gnathic Index	
Flower	8 (Fiji Islands)	Male and Female	103.7	
Turner	4 (New Guinea)	Male and Female	104.9	
Thomas	18 (New Guinea)	Male	106.5	107.1
	17 (New Guinea)	Female	107.7	
Dorsey	8 (New Guinea)	Male	107	108.5
	7 (New Guinea)	Female	110	
MacCurdy	10 (Neu Pommern)	Male	107.5	106.7
	7 (Neu Pommern)	Female	105.9	

Facial index.—The facial index expresses the ratio of the breadth to the height of the face. The distance from the root of the nose (nasion) to the most prominent point on the alveolar margin between the two upper median incisors (prosthion) is multiplied by 100 and divided by the bizygomatic breadth. The average facial index for the males is 48.8 and for the females 47.8. Both are chamaeprosopic, a character associated with lowly forms.

Index of palate.—The palates are all long in proportion to their breadth, the average index for males as well as females being what Broca would call microsème. None of the palates

are megasème. The human hard palate has been classified as rectilinear and curvilinear. When the branches of the alveolar arch are rectilinear and divergent there is produced the hyperbolic or human type; when the branches are parallel and rectilinear the result is the hypsiloid or simian type. Curvilinear branches are either divergent and hence parabolic or convergent and elliptic. The elliptic is a simian form. The arch of the hard palate is elliptic in eight cases (five males and three females), and hypsiloid in the case of three males. In more than half of the entire series therefore the hard palate is of a simian type.

Nasal index.—No matter which system is employed (French or German), the series easily falls within the platyrhine class; eight out of ten males and six out of eight females being platyrhine.

The naso-malar index $\left(\frac{\text{naso-malar length} \times 100}{\text{bimalar length}}\right)$ represents the degree of prominence of the nasal bridge beyond a straight line connecting the anterior margins of the malar bones. It was used by Oldfield Thomas[1] with valuable results, and has since been used extensively by Mr. Risley[2] in India, who accepts Mr. Thomas' nomenclature, but applies the terms to slightly different groupings of the indices. The series from Gazelle Peninsula is arranged according to both methods:

THOMAS

	Platyopic	Mesopic	Pro-opic	Average	
Males.....	6	4	0	Platyopic	107.3
Females..	3	4	1	Mesopic	

[1] Account of a collection of skulls from Torres Straits. *Journal of the Anthropological Institute*, XIV, 1885, p. 332.

[2] The Study of Ethnology in India. *Journal of the Anthropological Institute*, XX, 1891, p. 255.

RISLEY

	Platyopic	Mesopic	Pro-opic	Average	
Males	10	0	0	Platyopic	107.3
Females	7	1	0	Platyopic	

The general average index of 107.3 makes the series platyopic, whichever method is used, since the maximum limit placed by Thomas for platyopism is 107.4 and Risley's maximum limit is 109.9.

Thomas gives an interesting comparative table of average naso-malar indices, to which that of the series under discussion is added:

Number and Kind	Average Index	Range
7 Gorillas	103	101.7 to 103.8
9 Mongols	105.9	105.1 to 106.9
9 Timor Laut Malays	107.4	104.4 to 109.5
5 Andamanese	107.5	105.5 to 108.5
25 West African Negroes	108.5	106.1 to 113.3
35 Torres Straits Islanders	108.7	106.1 to 112
16 Caucasians	111.1	109.1 to 114.2
18 Gazelle Peninsula (MacCurdy)	107.3	104.8 to 110.1

Dental index[1].—On the whole, extreme indices seem to characterize the male sex in any given race. That is to say, indices which commonly fall below 100 average higher, and those greater than 100 average lower in the female sex than in the male. In the Neu Pommern series, for instance, the eleven indices smaller than 100, average 77.7 for the males, and 78.3 for the females; while the three indices greater than 100,

[1] Flower, *Journal of the Anthropological Institute*, XIV, 183.

average 106.1 for the males and 104.2 for the females. A comparative study of the published results for other series and races would probably reveal a like relation. This sexual difference of the indices, if indeed it prove to be a general one, is well illustrated in the proportion which the combined length of the upper premolars and molars in situ bears to the basi-nasal length:

Authority	Number and Country	Sex	Dental Index	Average Index for Both Sexes
Flower	21 (Melanesia)	Male	44.2	
Flower	9 (Andaman Islands)	Male	44.4	45.5
Flower	8 (Andaman Islands)	Female	46.5	
Flower	22 (Australia)	Male	44.8	45.5
Flower	14 (Australia)	Female	46.1	
Flower	9 (Tasmania)	Male	47.5	48.1
Flower	4 (Tasmania)	Female	48.5	
Thomas	5 (Torres Straits)	Male	43.5	43.8
Thomas	2 (Torres Straits)	Female	44.1	
Dorsey	4 (New Guinea)	Male	41	43
Dorsey	6 (New Guinea)	Female	45	
MacCurdy	1 (Gazelle Peninsula)	Male	44.9	45.3
MacCurdy	3 (Gazelle Peninsula)	Female	45.4	

In the series from Gazelle Peninsula, the combined length in situ of the premolars and molars of the lower jaw averages from 2 mm. to 6 mm. greater than that of the upper jaw. It was, therefore, thought desirable not to calculate indices from measurements on the lower teeth where these were present and the upper teeth were missing.

All the above groups belong to megadont races, the highest index being reached by the Tasmanians; and in each series, as might have been inferred, the average dental index of the female crania is higher than that of the males. A like relation of the dental index in the two sexes holds true among anthropoids also, as pointed out by Sir William Flower.

The Spina mentalis is either wanting or barely visible. The angle of symphysis is large, being equal to or exceeding a right angle in 47 per cent of the lower jaws. The average for the males is 85.3 degrees and for the females, 89.6. A comparison of these figures with results for other series including Quaternary man places the series from Gazelle Peninsula very near to the latter:

Authority	Number and Kind	Angle of Symphysis
Topinard	15 Parisian	71.4°
Topinard	15 African negro	82.2°
Topinard	15 New Caledonian	83.9°
MacCurdy	17 Gazelle Peninsula	87.5°
de Vibraye	Arcy (Quaternary)	90°
Dupont	La Naulette (Quaternary)	94°
Filhol	Malarnaud (Quaternary)	100°
Fraipont and Lohest	Spy No. 1 (Quaternary)	107°

Summary.—The skulls are small and all dolichocephalic. The minimum and maximum frontal diameters average respectively 20.3 mm. and 25.7 mm. less than for English crania. The height averages greater than the greatest breadth, a character called hypsistenocephaly. The crania are prognathous, platyrhine, platyopic, phaenozygous, and megadont. Glabella and superciliary arches, prominent. Apertura pyriformis, simian in character. Fossae caninae, pronounced. The teeth are well preserved and not crowded. The wisdom teeth are lacking in none. There is a tendency toward a division of

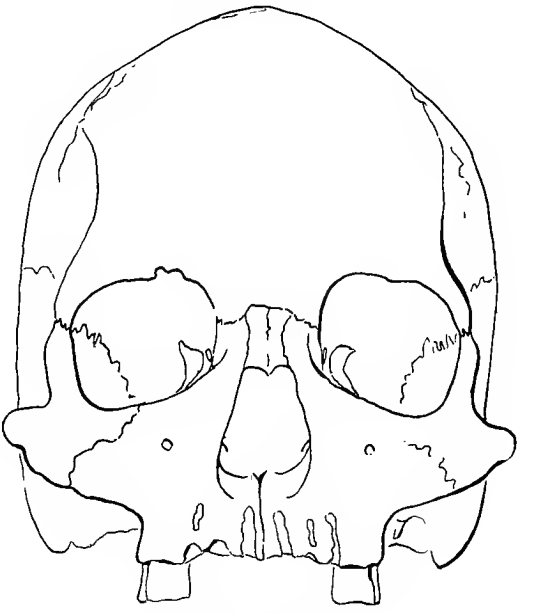
the root of the first upper premolars. The alveolar arch of the upper jaw projects considerably beyond (in one case as much as 12 mm.) the third molars. The percentage of first lower premolars with anterior roots is high. The spina mentalis is practically wanting, and the angle of symphysis, large.

SKULLS FROM GAZELLE

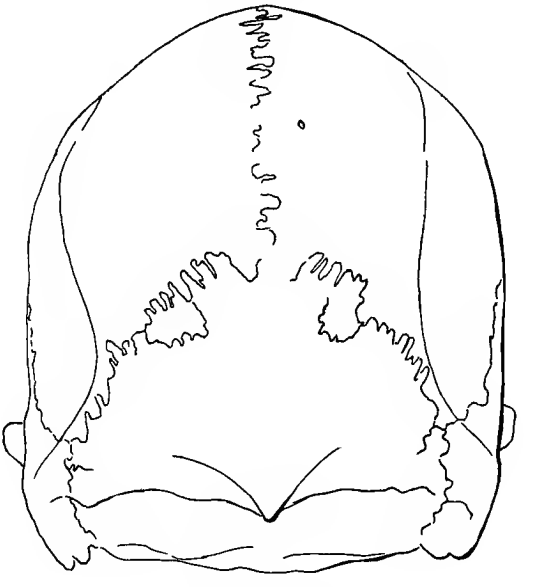
Museum Number	Males							
	11610	11611	11612	11615	11617	11618	11621	11622
Capacity	1328	..	1470	1385	1363	1078	1305	1315
Weight of cranium	697	..	600	760	633	703	631	750
Weight of lower jaw	118	...	109	105	106	93	114	97
Antero-posterior, diameter	185	186	182	188	184	176	176	180
Transverse maximum, diameter	128	124	134	140	124	122	132	132
Frontal maximum, diameter	108	106	116	113	107	106	108	110
Frontal minimum, diameter	95	93	94	98	90	94	93	90
Bizygomatic, breadth	135	..	135	136	135	130	138	130
Biauricular, breadth	115	112	118	125	113	113	122	123
Basibregmatic, height	139	.	136	131	138	127	132	126
Basialveolar, length	108	..	104	110	113	105	107	108
Basinasal, length	101	..	102	103	105	96	96	100
Foramen magnum, length	36	...	39	31	37	31	31	37
Foramen magnum, breadth	35	...	30	28	29	24	26	28
Palate, length	59	..	55	56	63	57	55	60
Palate, breadth	35	. .	30	28	29	24	26	28
Nose, length	48	...	53	48	48	41	49	48
Nose, breadth	26	...	26	28	27	25	27	30
Orbit, breadth	38	38	37	38	37	39	38	38
Orbit, height	33	32	36	34	34	33	31	35
Interorbital, breadth	28	25	24	25	24	26	27	27
Nasoprosthionic, length	69	...	70	64	67	62	69	68
Bimalar, breadth	102	...	99	100	96	101	104	100
Nasomalar	110		104	105	105	109	109	107
Bicondylar, breadth	124	112	115	125	117	116	121	117
Bigonial, breadth	96	79	98	95	97	87	94	93
Symphysis, height	33	30	28	30	33	28	32	29
Molar, height	30	26	28	29	30	23	27	23
Mandibular angle	108°	119°	109°	105°	113°	111°	121°	118°
Angle of symphysis	88°	78°	75°	87°	92°	86°	85°	82°
Cephalic index	69	67	74	75	67	69	75	73
Vertical index	75		75	70	75	72	75	70
Transverso-vertical	109	..	102	94	111	104	100	96
Gnathic	107	..	102	107	108	109	111	108
Palatal	61	...	73	77	60	64	76	68
Nasal	54	..	49	58	56	61	55	62
Orbital	87	84	97	90	92	85	82	92
Facial	51	.	50	47	42	47	50	52
Naso-malar	108		105	105	109	108	105	107
Dental	..	..	..	...	45	...	..	..

PENINSULA, NEW BRITAIN

			Females								Average Males	Average Females	Average Both Sexes
16911	18280	18282	11613	11620	11609	11614	11623	16912	18283	18281			
1382	1408	1418	1190	1285	1224	1165	1200	1133	1194	1325	1345	1215	1280
639	1014	718	649	580	471	486	414	460	515	540	715	534	625
92	149	96	82	86	76	78	67	42	75	76	108	73	91
190	190	192	167	176	181	170	177	174	175	174	182	174	178
133	130	130	129	128	126	127	123	124	125	128	130	126	128
108	108	106	106	106	106	101	105	98	102	108	109	104	107
89	96	93	95	93	94	90	91	82	87	91	93	90	92
130	136	140	128	123	129	124	120	132	124	129	133	126	130
122	122	120	113	113	116	116	114	116	116	117	119	115	117
136	149	143	128	127	124	120	122	130	128	128	136	126	131
116	112	110	98	107	108	98	102	. . .	97	105	110	102	106
104	106	105	92	97	101	95	98	99	95	98	102	97	100
31	37	39	30	33	31	32	32	32	31	34	35	32	34
29	28	29	27	26	27	29	28	26	24	32	29	27	28
60	56	58	47	58	60	53	52	. . .	51	58	52	54	53
29	28	39	33	33	42	35	39	. . .	39	36	39	37	38
50	49	47	40	44	44	44	48	50	46	43	48	45	47
25	29	29	24	25	24	24	27	25	21	26	27	25	26
37	37	39	38	38	38	35	36	37	36	36	38	37	38
34	31	31	31	32	31	32	34	34	33	31	33	32	33
24	27	26	24	24	27	24	26	23	22	23	26	24	25
71	64	62	52	.	61	63	62	. . .	59	62	66	60	63
96	100	103	98	97	101	91	94	95	94	95	100	96	98
102	108	109	104	103	110	100	104	103	102	101	107	103	105
115	121	122	111	102	110	113	103	. . .	109	115	119	109	114
88	93	81	89	80	81	81	78	. .	82	82	91	82	87
32	34	30	26	30	29	26	26	.	29	28	31	28	30
27	35	24	24	23	25	24	22		27	24	27	24	26
117°	107°	112°	116°	113°	111°	116°	119°	. .	108°	116°	113°	114°	113°
97°	. . .	88°	83°	90°	92°	90°	90°	. .	92°	90°	85°	90°	88°
70	68	68	77	73	70	75	70	71	71	74	71	73	72
72	78	75	77	72	69	71	69	75	73	74	74	72	73
102	114	110	99	99	98	95	99	105	102	100	104	100	102
112	106	105	107	111	107	104	104	. . .	102	107	108	106	107
63	71	67	70	57	70	66	75	. . .	77	62	68	68	68
50	58	62	61	57	55	55	56	50	46	61	57	55	56
92	84	80	83	84	82	91	93	92	92	86	88	88	88
54	46	48	42	48	47	50	52	.	48	48	49	48	49
107	108	106	106	106	109	110	110	108	108	106	107	108	107
. .	. .	. . .	. .	49	. . .	46	. . .	. .	42	. . .	45	45	45



NORMA FACIALIS



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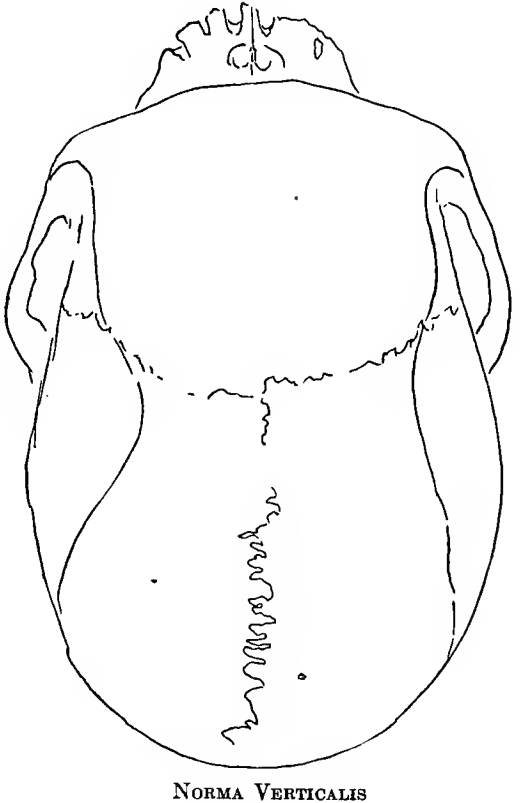

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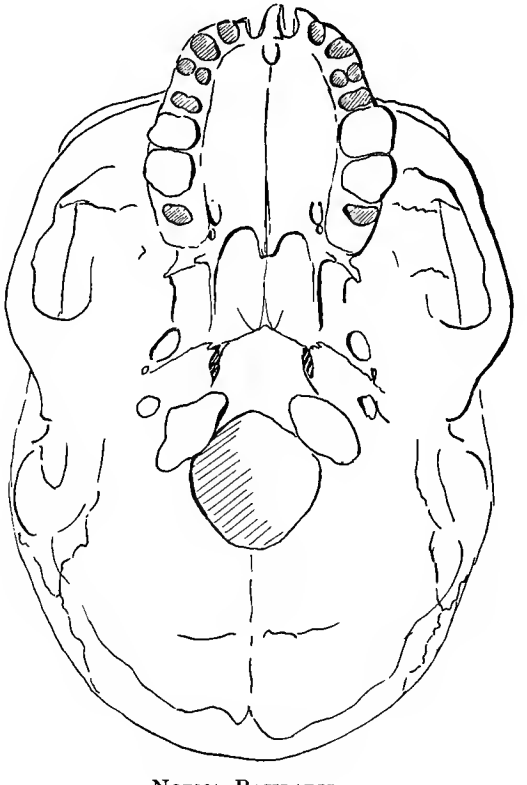
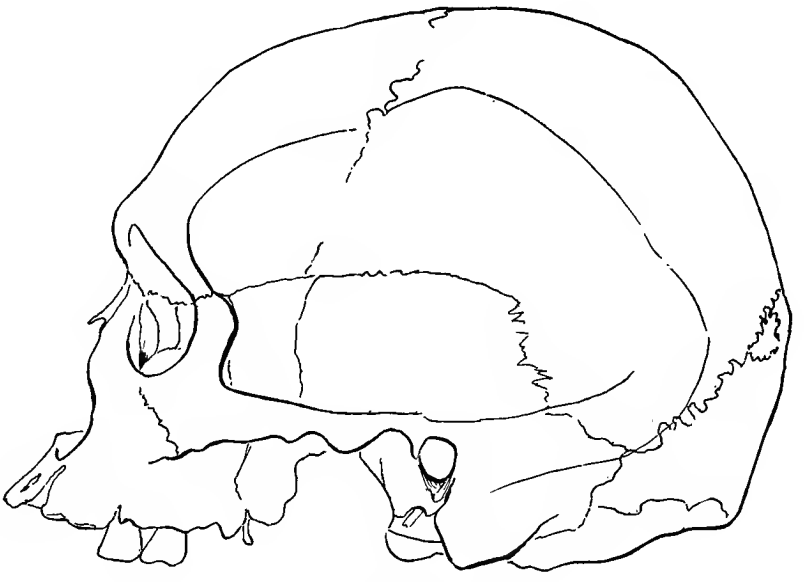


NORMA BASILARIS

11610



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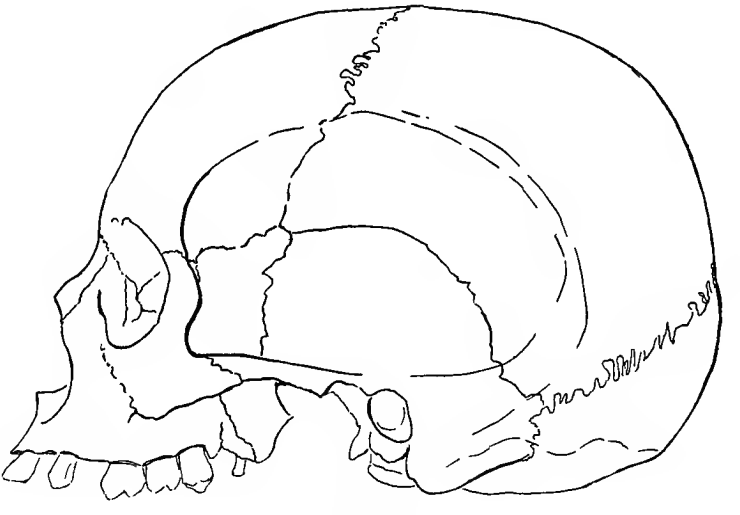
NORMA LATERALIS



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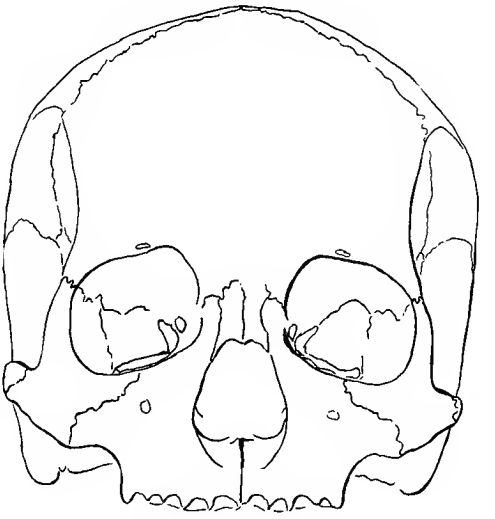

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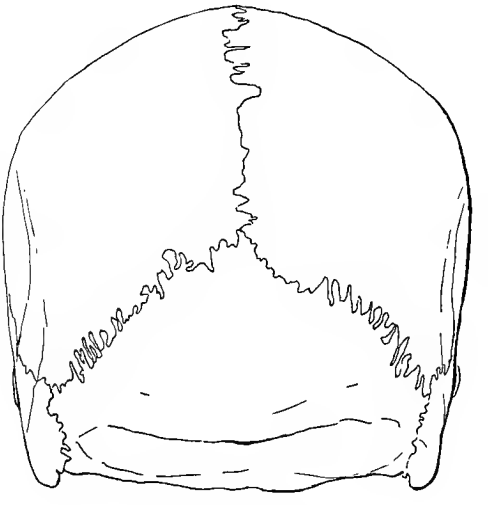

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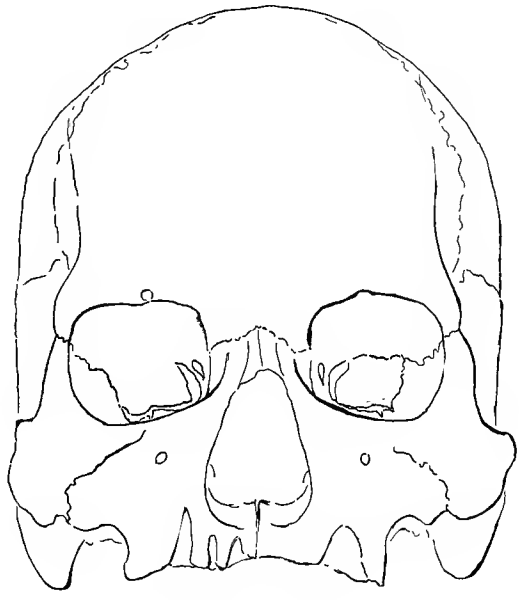

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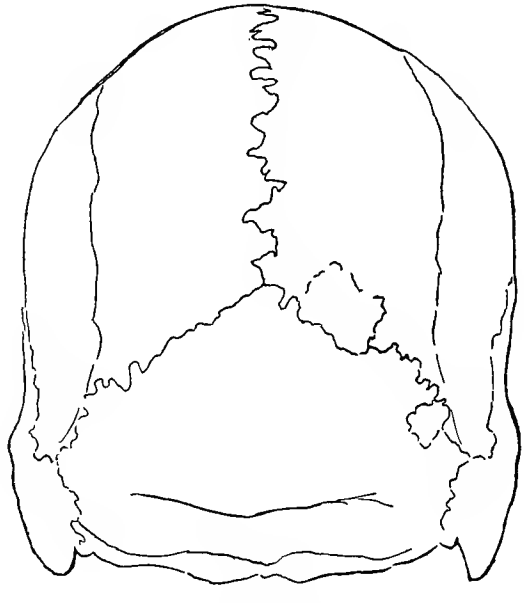

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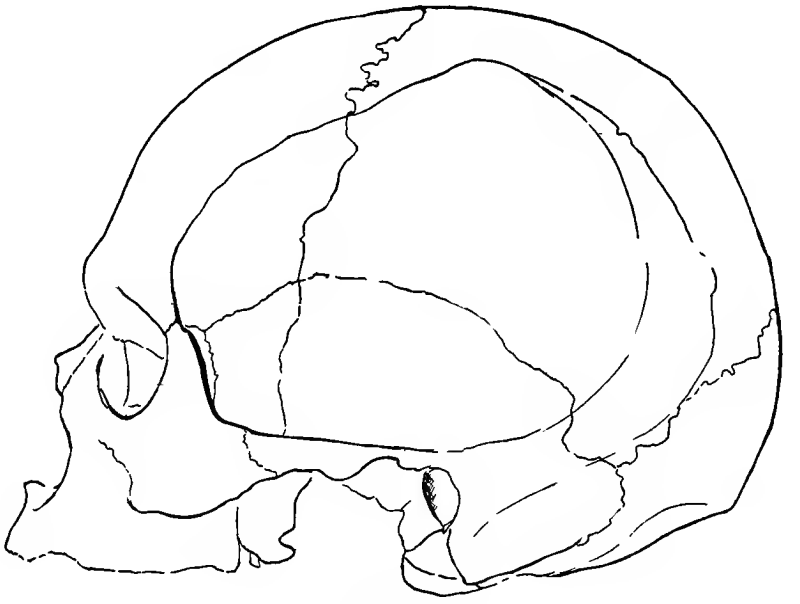

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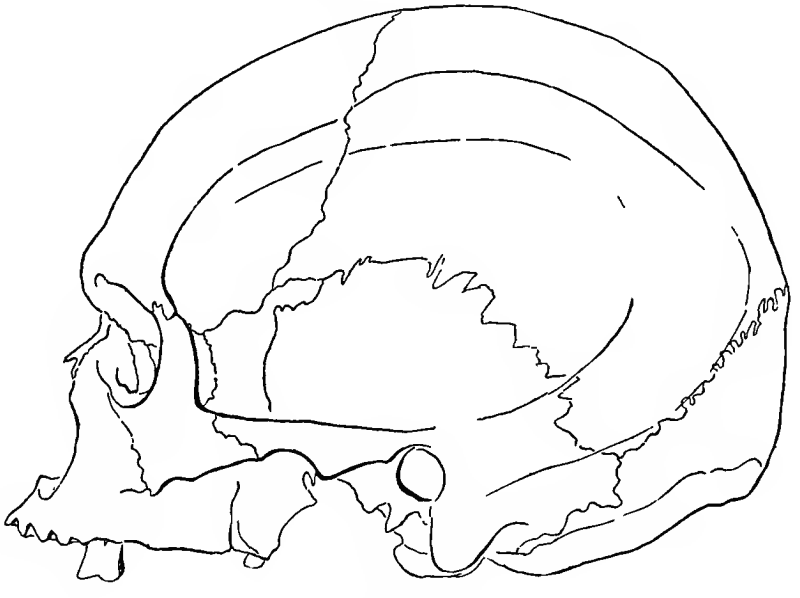

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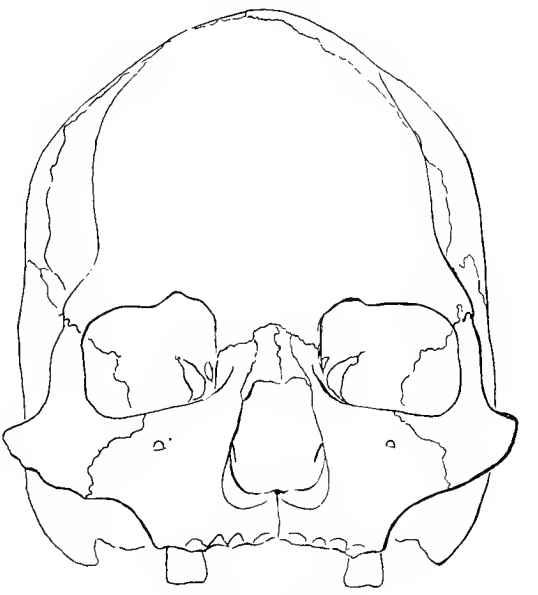

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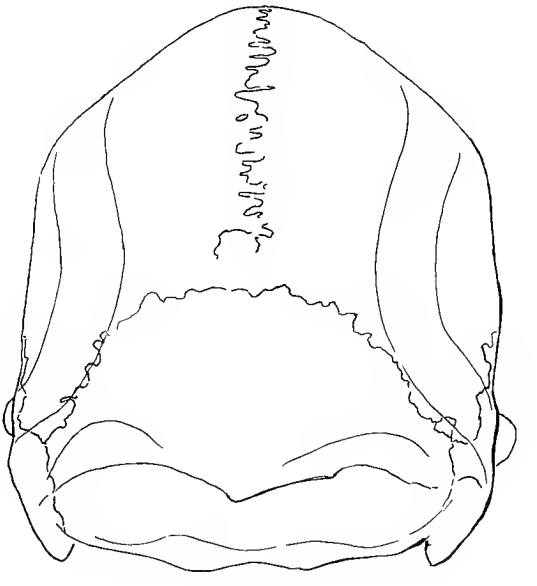

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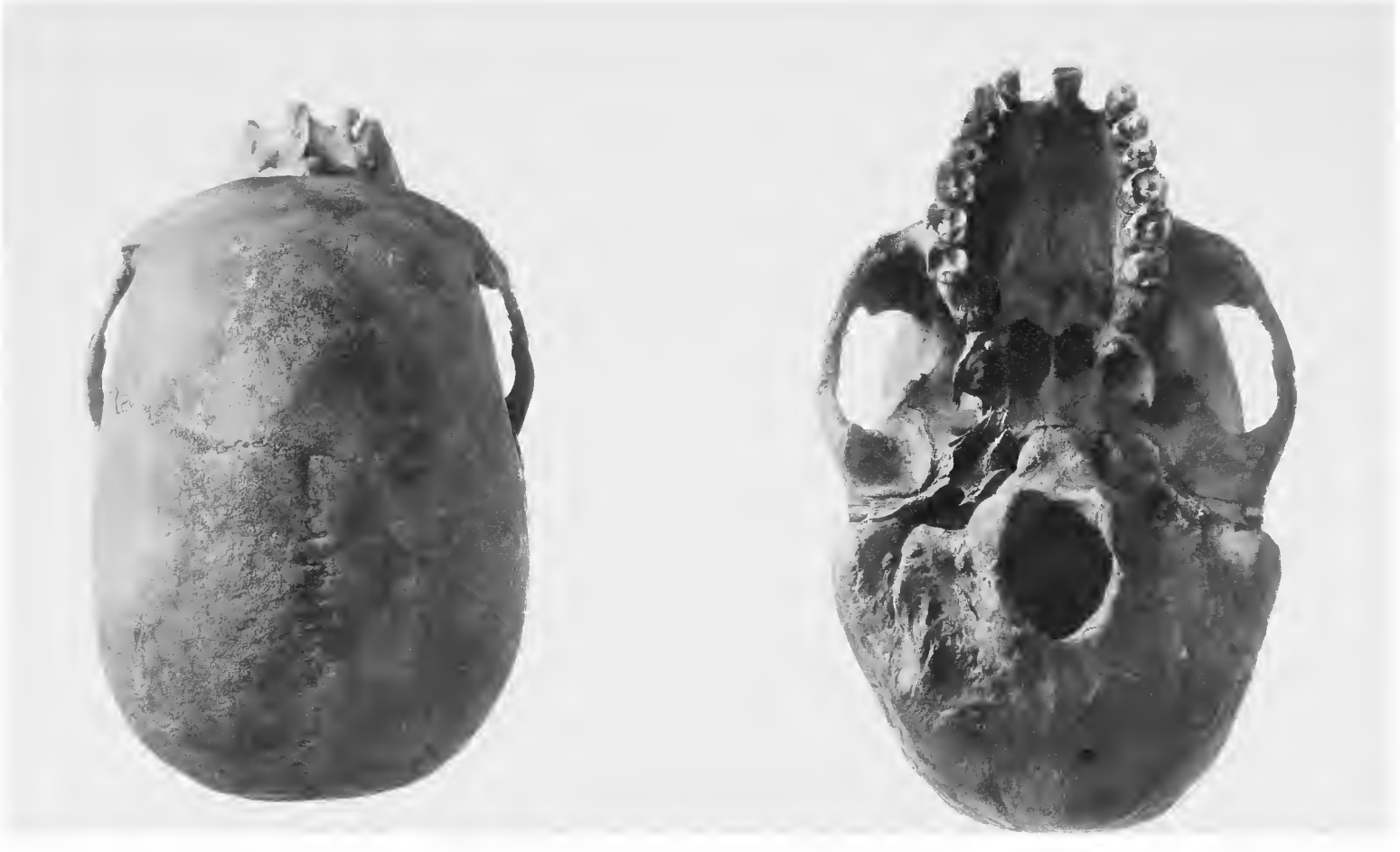

11617

NORMA VERTICALIS

NORMA BASILARIS

11617

NORMA FACIALIS

NORMA OCCIPITALIS

11617

NORMA LATERALIS

18282

FORAMEN PTERYGO-SPINOSUM PRODUCED BY THE OSSIFICATION OF THE LIGAMENTUM PTERYGO-SPINOSUM